M E M O R A N D U M

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THROUGH: Dan Olson, Air Quality Administrator

FROM: Ken Rairigh, Air Quality Engineer

SUBJECT: Modeled Exceedance of 24-Hour PM_{10} Increment at Solvay Soda Ash

DATE: September 22, 1997

The Division has completed its review of the modeling analysis submitted by Woodward-Clyde consultants on behalf of Solvay Soda Ash for their proposed expansion. During the Division's review of the modeling analysis submitted by Woodward-Clyde, it was determined that a fine receptor grid was not used to insure that the maximum model predicted concentration was identified.

Woodward-Clyde's protocol addressed the selection of receptors to be used in the modeling analysis for Solvay. In this protocol, Woodward-Clyde proposed to use a polar receptor grid layout for the modeling analysis. The receptor grid was to incorporate a coarse grid of 10 "rings" set at 10° increments. The protocol indicated that areas with the highest predicted concentrations identified from the coarse grid would be modeled further using a fine grid to insure that the maximum model predicted concentration is identified; the fine grid would consist of at least 100 receptors placed at 100 meter intervals around the point(s) of highest impact using 5° increments. To be consistent with previous modeling analyses, the Division added a 10x10 matrix receptor grid using a 100-meter resolution spacing (fine grid) around the maximum 24-hour PM_{10} concentration predicted by the 500-meter grid. The elevations used in the fine grid were taken from USGS 7.5 minute series topographic maps.

Receptor locations and the plant works boundary as submitted by the consultants are shown in Figure 2. The elevation contours defined by the coarse grid and the 100-meter fine grid, along with the plant works boundary are shown in Figure 2a. A three-dimensional representation of the local topography represented in the model is shown in Figure 2b. The results of the Division's analysis are presented in Figure 3. The results of Woodward-Clyde's analysis are presented in Figure 4. A comparison of the modeled results for 24-hour PM_{10} impacts from the Solvay facility are presented below:

Woodward-Clyde Consultants	Wyoming DEQ/AQD
HSH 24-hr impacts ($\mu g/m^3$)	HSH 24-hr impacts ($\mu g/m^3$)
NEW: 10.70 @ (603500,4595600)	NEW: 10.70 @ (603500,4595600)
EXIST: Not Evaluated in Analysis	EXIST: 31.95 @ (602650,4594400)
ALL: 29.11 @ (602500,4594500)	ALL: 39.98 @ (602650,4594500)

From the data presented above, it can be seen that the existing sources at Solvay Soda Ash produce an impact that is already greater than the allowable PM_{10} 24-hour PSD Class II increment since all sources at Solvay Soda Ash that emit particulate matter are increment consuming sources, as they were constructed after the major source baseline date for PM_{10}. However, the results of Woodward-Clyde's modeling analysis indicated that the existing facility, including the proposed modifications, is in compliance with all applicable National Ambient Air Quality Standards (NAAQS) and PSD increments.

A wind rose which represents the surface wind patterns during 1984, 1985, 1987, 1988 and 1989, is portrayed as a five year averaged joint frequency distribution, and is shown in Figure 1. An average of the wind statistics for this data set indicates that the winds are predominantly from the west-southwest at 21% of the time. The location of the maximum annual impacts for all pollutants are governed by the predominant wind direction. However, the maximum and high-second high 24-hour concentrations are predicted to occur to the southwest of the facility near the plant works boundary. The model predicts impacts to the southwest for hours that are represented by very low speed winds from the northeast; these low speed winds trap pollutants against the steep terrain to the southwest of the Solvay facility.

A Class II PM_{10} increment consumption analysis using the two PM_{10} increment consuming sources at General Chemical (GR54 and GR58), and all existing and proposed PM_{10} sources at Solvay Soda Ash was performed by the Division. The purpose of this analysis was to determine compliance with the 24-hour and annual PM_{10} PSD increments of 30 $\mu g/m^3$ and 17 $\mu g/m^3$, respectively. The highest-second highest modeled 24-hr concentration was 39.98 $\mu g/m^3$ at UTM location (602650,4594500); the contribution from the existing facility was 31.72 $\mu g/m^3$, and the contribution from the proposed modification was 8.24 $\mu g/m^3$. The contribution from General Chemical was 0.021 $\mu g/m^3$.

The results of the Division's review indicates that the NAAQS will be protected for PM_{10}, NO_2, and CO. The Division's analysis indicates that all PSD increments with the exception of the 24-hr increment for PM_{10} are below all applicable standards for both Class I and Class II increment levels, and indicates that the 24-hr increment for PM_{10} will be exceeded due to the amount of PM10 emitted from Solvay Soda Ash.

FIGURE 2

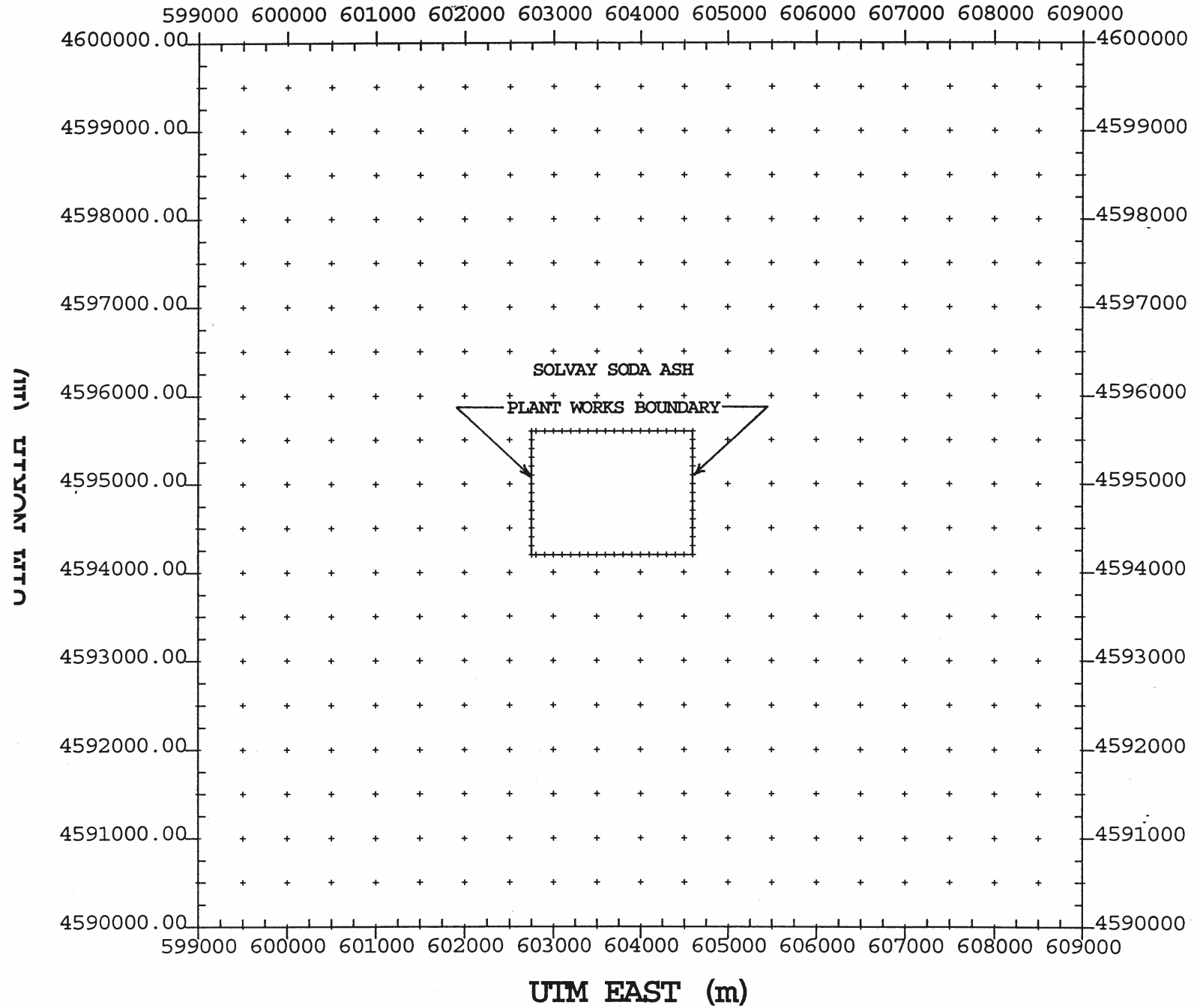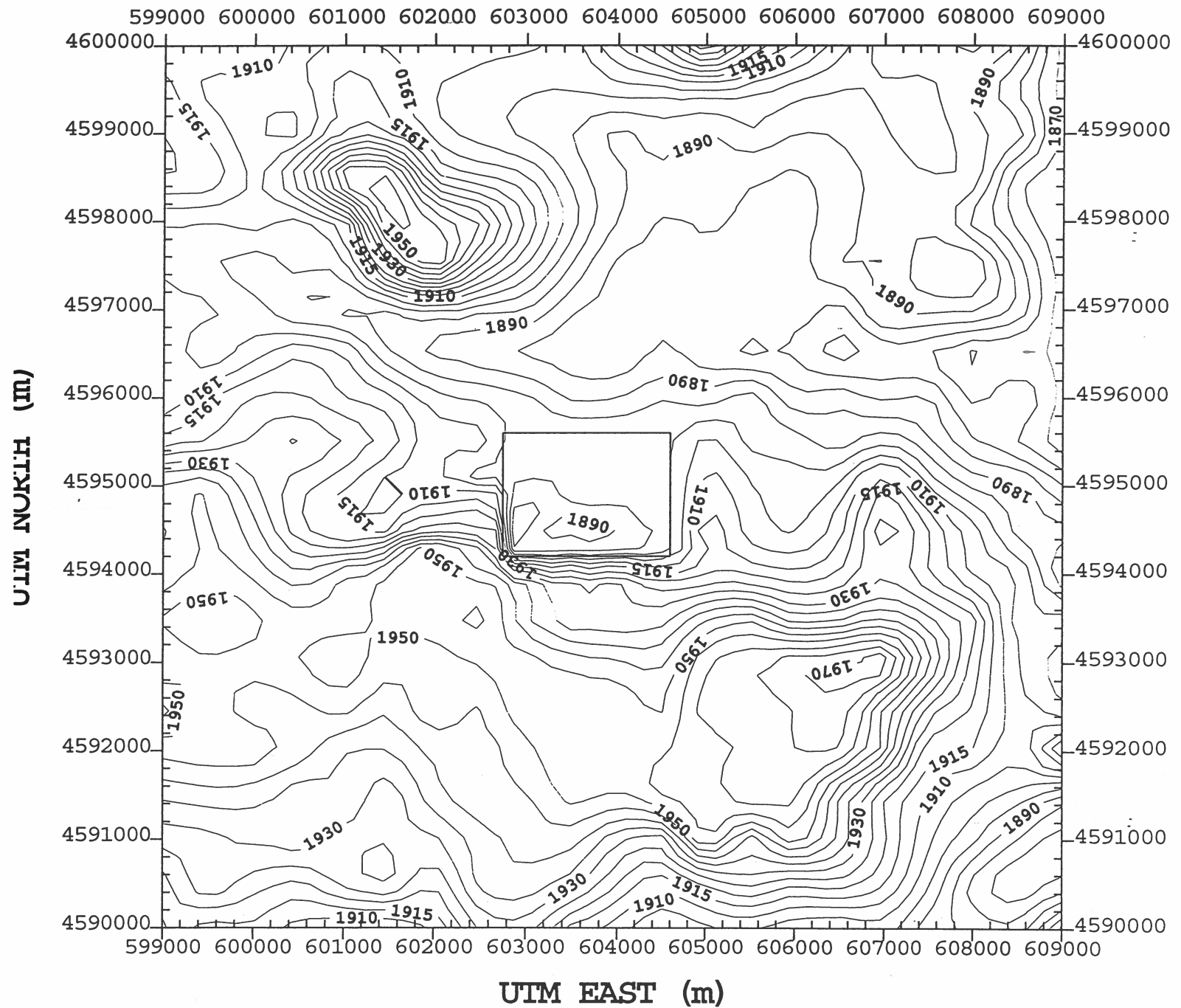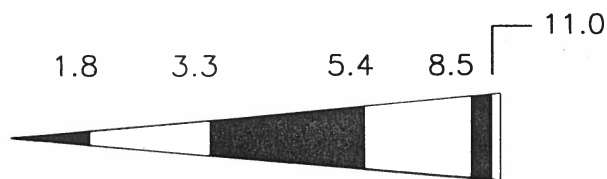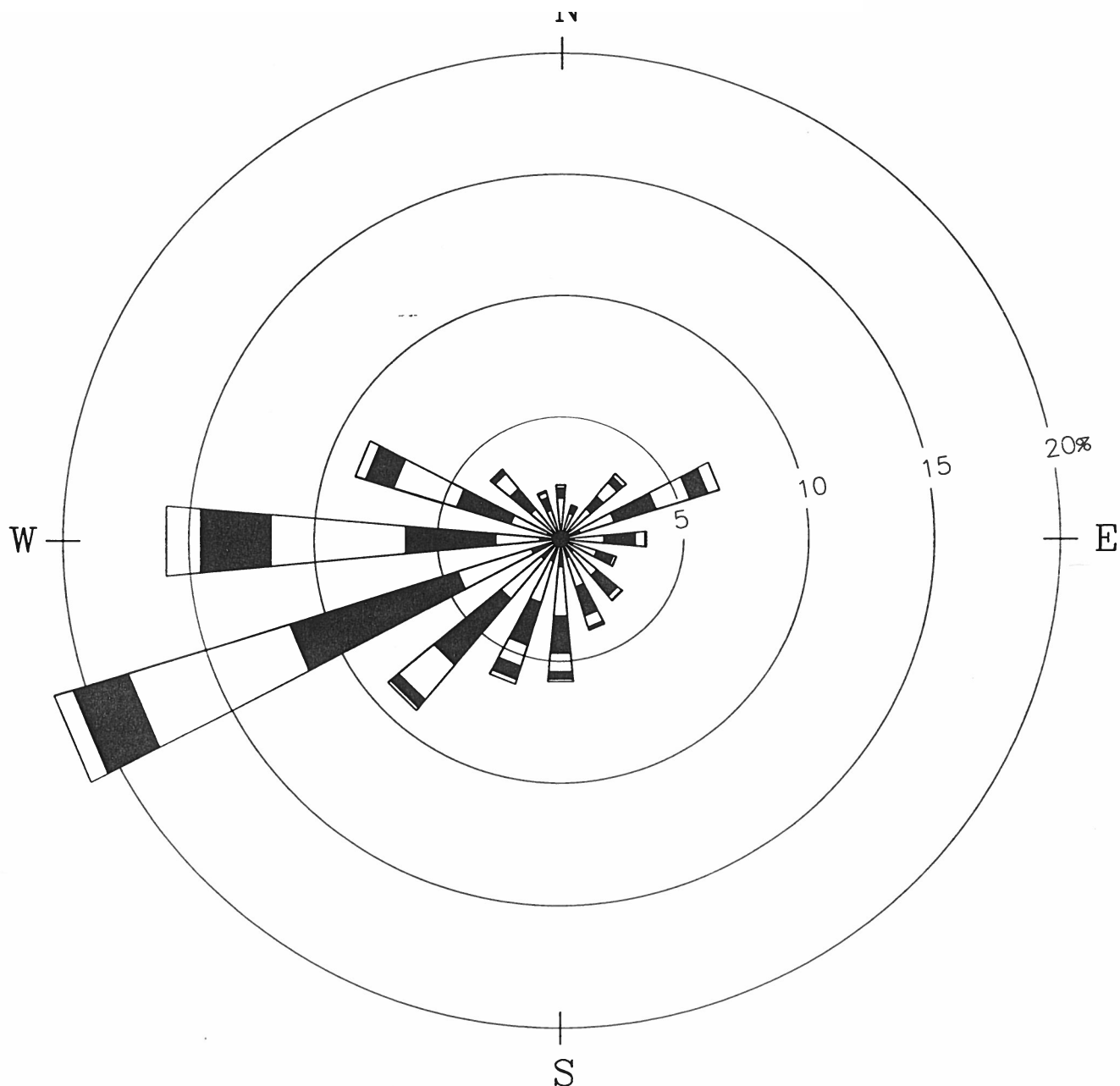## RECEPTOR LOCATIONS - SOLVAY SODA ASH MODELING ANALYSIS

SOLVAY SODA ASH
PLANT WORKS BOUNDARY

UTM EAST (m)

UTM NORTH (m)

FIGURE 2a

ELEVATIONS USED IN MODELING ANALYSIS FOR SOLVAY MINERALS

SOLVAY2016_1.4_000628

N

W — — E

S

20%

15

10

5

WIND SPEED CLASS BOUNDARIES
(METERS/SECOND)

1.8   3.3   5.4   8.5 ⌐ 11.0

NOTES:
DIAGRAM OF THE FREQUENCY OF
OCCURRENCE OF EACH WIND DIRECTION.
WIND DIRECTION IS THE DIRECTION
FROM WHICH THE WIND IS BLOWING.
EXAMPLE – WIND IS BLOWING FROM THE
NORTH 2.2 PERCENT OF THE TIME.

FIGURE 1
WINDROSE

RKSLND5Y.STR
NWS RKS/LND DATA SET
5YR JOINT FREQUENCY
ROCK SPRINGS AIRPORT
PERIOD: 1984–1989

Figure 2b. Topography Represented in Modeling Analysis for Solvay Soda Ash
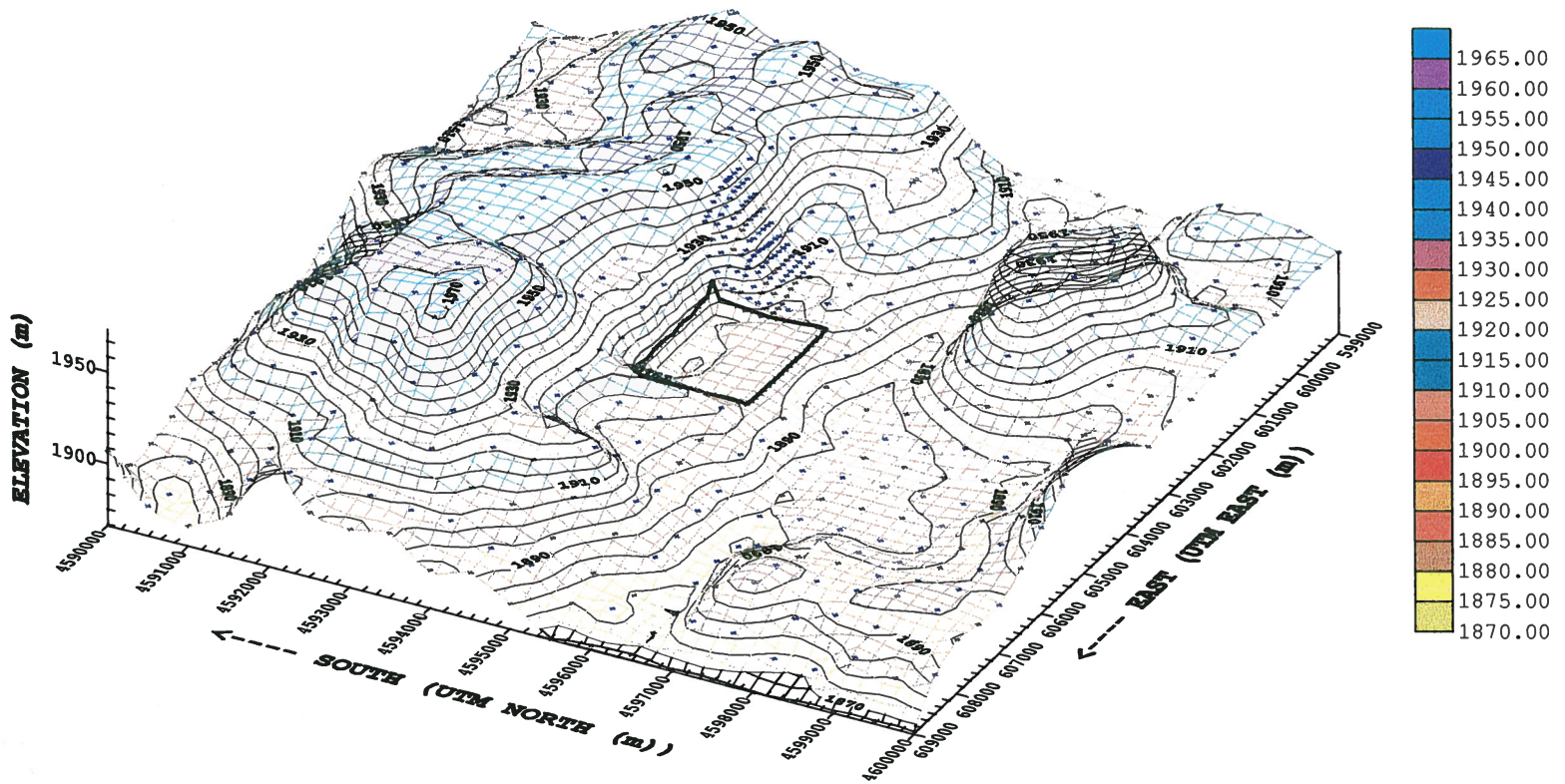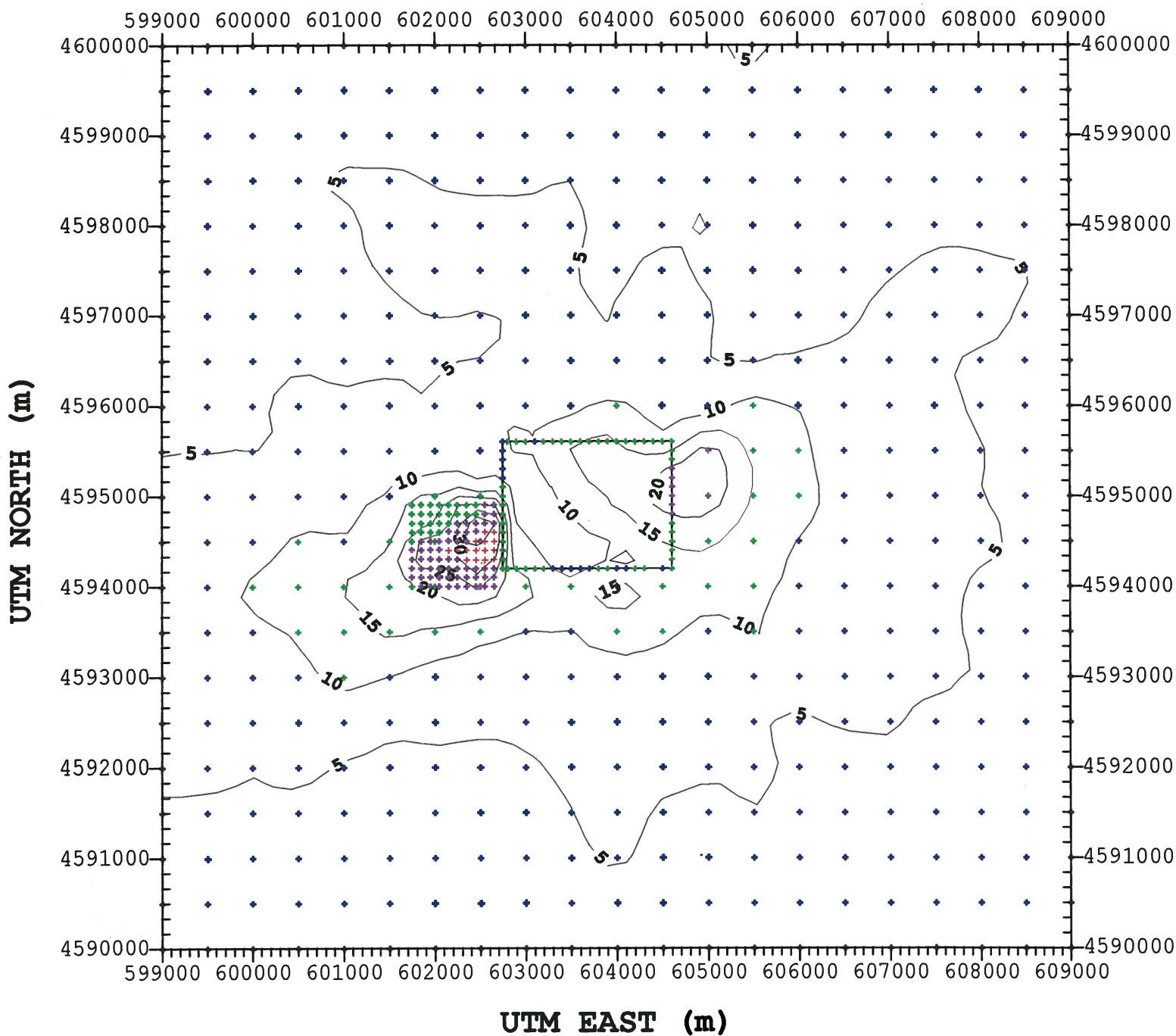
FIGURE 3

HSH 24-HR PM10 CLASS II INCREMENT CONSUMPTION
(SOLVAY SODA ASH AND GENERAL CHEMICAL)

RECEPTOR VALUE (ug/m3)

- 0.00 to 10.00
- 10.01 to 20.00
- 20.01 to 30.00
- 30.01 to 40.00

SOLVAY2016_1.4_000631

FIGURE 4

HIGHEST SECOND HIGH 24-HR PM10 CONC (ug/m3)

HSH 24-HR PM10 CONC = 29.11 ug/m3
(BACKGROUND NOT INCLUDED)

UTM EAST (m)

SOLVAY2016_1.4_000632